

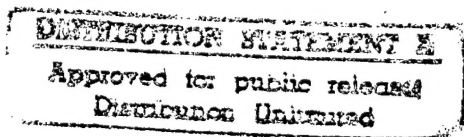
GATHERING OF EAGLES TOOLBOOK

A Research Paper

Presented To

The Directorate of Research

Air Command and Staff College



In Partial Fulfillment of the Graduation Requirements of ACSC

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Abstract

The GOE ToolBook is an interactive, computer database depicting aviation heroes from the annual Gathering of Eagles (GOE) events at Maxwell Air Force Base, Alabama in 1994, 1995, and 1996. The GOE ToolBook is designed to present aviation heritage in a way that is both enjoyable and educational. Indexed and simple to navigate, the GOE ToolBook does several things: It allows the user to view attractive, high-resolution scans of artwork depicting the aviation heroes ("Eagles") and their aircraft. (The artistic depictions are from original paintings commissioned by the GOE teams and the International Association of Eagles, a private organization established to promote aviation history.) The ToolBook presents written narratives about the Eagles and their aircraft, derived from research conducted by the GOE Teams of 1994, 1995, and 1996. The ToolBook also contains audio and video segments showing all but a few of the Eagles in live on-stage interviews and almost all of their aircraft in flight. (In some cases, the video segments capture the Eagles actually flying their aircraft at key moments in history. In other cases, their type of aircraft can be seen in flight.) Future GOE teams are expected to expand the GOE ToolBook to include the artwork and historical information from past GOEs (dating back to 1982) and from future GOEs.

Chapter 1

Overview and Objectives

Since 1982, the Air Command and Staff College (ACSC) and the International Association of Eagles (IAE)¹ have jointly sponsored the annual Gathering of Eagles (GOE). The GOE—set to coincide with ACSC graduation in late spring—is an event spanning several days in which key figures in world aviation history gather at Maxwell Air Force Base, Alabama, to share their experiences and knowledge with ACSC students and the Maxwell-Gunter Community. Each GOE is attended by about twenty “Eagles,” as these aviation figures are known, who participate in a variety of activities, which include on-stage teaching interviews and personal contacts with students and guests. Part of the annual GOE tradition has been the commissioning of a painting depicting the individual Eagles and aircraft with which they are associated. The paintings typically include two side panels with portraits of the Eagles autographed by them, and a centerpiece showing their aircraft.² To accompany the paintings, GOE organizers have developed full-color booklets with reproductions of the Eagles’ portraits and historical narratives about the Eagles and their aircraft. The GOE is now in its fifteenth year, and the materials associated with the GOE—the paintings, the booklets, video-taped interviews of the Eagles, etc.—have become a significant aviation heritage collection.

Recent technological developments have provided the means for capturing and preserving, in one easy-to-use database, the images and information from past GOEs, and for expanding that database with material from future GOEs. Employing this technology, the GOE ToolBook captures the artwork, historical narratives, and audio-video segments from GOEs 1994, 1995, and 1996. The structure, or "shell," is also in place enabling future GOE teams to expand the ToolBook to include past materials, dating back to the original 1982 GOE, and to include GOE material as it is developed in the future.

Notes

¹ Until 1994, the International Association of Eagles was known as the Gathering of Eagles Foundation.

² These paintings are reproduced as limited-edition lithographs. The sale of these lithographs, personally autographed by each Eagle, is the primary means of funding the GOE.

Chapter 2

Toolbook Description

What is a ToolBook?

A ToolBook is an interactive software package designed to enhance learning by enabling the user to move through written narration, photographic images, video segments, audio background, and other media.

Background and General Description of the GOE ToolBook

In addition to creating the ToolBook under discussion, the GOE Research Team (“the Team”) had the separate but related task of bringing about the 1996 GOE *event*. Conducting its own research and receiving input from the IAE, past GOE teams, ACSC classmates, and others, the Team selected the Eagles for 1996. Once the Eagles had been selected, the Team determined the Eagles’ ability to come continued its research, interviewing the Eagles personally and gathering historical materials (including photographs and video segments) about them and their aircraft. Ultimately, in collaboration with the IAE, the Team either commissioned or developed the artwork, narratives, video-taped teaching interviews and other materials for the 1996 GOE. GOE teams from previous years produced their respective GOE materials in similar fashion.

The GOE ToolBook is made up of the 1996 materials the Team developed, and materials produced by the 1994 and 1995 teams. As noted above, the GOE ToolBook also sets the framework to allow all GOE materials, past and future, to be added to the ToolBook.

Quality and User-Friendliness

In layers, the Team built into the GOE ToolBook material from the GOEs of 1994, 1995, and 1996; and created the “shell” for adding material from the remaining past years and future years. In addition to these substantive elements, the Team wanted the GOE ToolBook to be a user-friendly, “commercial quality” product. The Team designed the ToolBook to: (1) be easy to navigate; (2) respond quickly to commands from the user; and (3) have high-resolution imagery capable of faithfully representing the artistic and other depictions scanned into it.¹ Field testing of the GOE ToolBook indicates that it does very well all that it was created to do.² The following is a general description of how the ToolBook is arranged and works.

Notes

¹ Many factors affect the performance and response of this ToolBook. In testing conducted by the Team, as the performance capabilities of the computer platform improved so did the overall performance of the ToolBook. While it functioned on 486-33 MHz systems with 4 MB of RAM, performance degradation rendered it almost unusable. On 486-66 MHz systems with 8 MB of RAM, performance was greatly enhanced. However, video clips incorporated into the ToolBook did not display smoothly. Excellent results were obtained on 486-100 MHz and Pentium systems with 8 and 16 MB of RAM respectively.

² At Appendix A is a more detailed, technical description of the methods employed to develop the GOE ToolBook, the Team’s field testing, and the lessons learned in meeting the criteria set for the ToolBook. Appendix A is included for the benefit of future GOE research teams and for developers of similar computer-based products.

Chapter 3

Design and Flow of the GOE ToolBook

Introductory Pages

Upon accessing the GOE ToolBook, the user meets an Opening Page with a copyright notice and five “hot” buttons. (“Hot” means that clicking the mouse on the button will take the user to the page or item designated by the button.) The user can select: (1) “Disclaimer”—to read the ToolBook’s disclaimer policy; (2) “Start”—to run the ToolBook, beginning with a short video tribute to aviation history accompanied by music from the Fifteenth Air Force Band; (3) “Start without Video”—to run the ToolBook without the video and audio segments; (4) “Index Page”—to use the indexes described further below; and (5) “Eject”—to exit the ToolBook.

Choosing to start the program, with or without the video, takes the user to an Introduction Page with a written dedication to those who shaped our air and space heritage. From this Introduction Page, the user can select: (1) “How to use the ToolBook”—for a discussion on navigating the ToolBook; (2) “What is the Gathering of Eagles”—for a discussion of GOE and its background; or (3) “Continue”—to move to the Master Gallery Page. At the Introduction Page there is more music from the Fifteenth Air

Force Band, which plays until the user moves deeper into the ToolBook. From the Introduction Page, the user can also select Index Page or Eject.

Master Gallery Page

At the Master Gallery Page are replications of the GOE paintings from 1994, 1995, and 1996 (without side panels). Clicking on any one of the paintings takes the user to the corresponding Lithograph Page. At the Master Gallery Page, the user may also select Index or Eject.

Lithograph Pages

At any of the three Lithograph Pages, the user finds the GOE lithograph from the year selected. Next to each lithograph is a list of the Eagles for that year. Placing the cursor over the name of any Eagle causes the aircraft that Eagle is associated with to become highlighted in the lithograph, thus enabling the user to link Eagles to their aircraft. Clicking on any one of the aircraft takes the user to the corresponding Setting Page. From the Lithograph Page, the user can also select Master Gallery Page, Index Page, or Eject.

Setting Pages

Each Setting Page displays the aircraft (now larger and in greater detail) selected at the Lithograph Page, a portrait of the Eagle (from the time period in which the Eagle is associated with the aircraft shown), and a paragraph describing the historical setting surrounding the Eagle and the aircraft. At all but a few Setting Pages, the user can click on the picture of the aircraft to see a video display of that aircraft in flight. The user can

also click on the Eagle's portrait to go to a Biography Page about that Eagle. Or, the user can select the previous Lithograph Page, the Master Gallery, the Index Page, or Eject.

Biography Pages

Each Biography Page displays a portrait of an Eagle and a biographical narrative about the Eagle. At all but a few Biography Pages, the user can click on the word "Video" to watch a portion of an on-stage interview with the Eagle. At the Biography Page, the user can also go back to the Lithograph Page, to the Master Gallery, to the Index Page, or Eject.

Index

The user can view the artistic and historical depictions of the GOE ToolBook by moving back and forth through the pages, as described above. A hot-word Index is also available. The Index is divided into two parts, the Eagle Index and the Aircraft Index. At the Eagle Index, in alphabetical order, are the names of Eagles and other matters contained in the GOE ToolBook. Clicking on any name or item listed in the Eagle Index takes the user directly to the place in the ToolBook where that Eagle or item is featured. Similarly, the Aircraft Index lists the aircraft in the GOE ToolBook, and these can be viewed by clicking on the aircraft names.

Chapter 4

Summary

The GOE ToolBook, in its current state, consists of 132 pages (most of it historical information and artistic depictions), plus video and audio segments from the GOEs of 1994, 1995, and 1996. The GOE ToolBook meets the criteria the Team set for it. It is easy to navigate. When run on an appropriate system, the ToolBook responds quickly to commands from the user and boasts high-resolution imagery that faithfully captures the artwork and other materials scanned into it. It is anticipated that future GOE teams will expand the ToolBook, adding GOE material from the past years not yet included and from GOEs yet to come.

Appendix A

Discussion of Technology

1. **Purpose:** The GOE Team has learned many lessons, found some shortcuts, and suffered several sore thumbs in putting together this marvel of 100+ pages. This appendix is to help future research teams develop their ToolBooks when using Asymetrix multi-media products. Also, this appendix should give ToolBook developers a head start by framing major parameters and key design considerations. Mistakes and false starts can be avoided. The authors hope that future GOE Teams, and others, will benefit from these notes and analyses. Separating the wheat from the chaff is left to the reader.
2. **Storyboarding:** Like most ToolBook projects, this one started with a storyboard. Similar to a cartoon strip, this sequence of pictures helps the developers “see” the blueprint for the ToolBook. The storyboard method helps develop the game plan and picture structure for the ToolBook. It should also provide the road map of the ToolBook by making it clear how the user will navigate throughout the ToolBook, when complete. In the end, the GOE storyboard made it obvious that this should not be a linear ToolBook. Therefore, the GOE Team designed this ToolBook to be like an art gallery, where the user can “wander from room to room” learning about Air Force history in an enjoyable atmosphere.
3. **Scanning:** the lithographs into the ToolBook was done by, both cutting up a damaged GOE litho and using a full-size print, and laying it on a scanner. The scanning resolution (in dots per inch) was set to 125. The picture size was kept to about 3” x 3” to keep pixel size down. The picture was scanned using Paintshop Pro (rather than OFOTO), because OFOTO adds 555k of memory to each saved picture, as overhead. Due to its graphics-intensive nature, this would have made the ToolBook much larger and would have slowed the transition time between pages. The numbers of colors was kept below 256 (again to reduce memory use). Finally, when the scanned picture was lined up straight, the missing background was “painted in” using Paintshop Pro.
4. **Pallet Shift:** We had a difficult time with “pallet shift,” when we added a second year to the ToolBook. Pallet shift is a change in screen colors as the

page transitions. It occurs due to the different colored paints used from year to year by the different Artists. Not only does pallet shift slow down a ToolBook, it is distracting to watch colors shift and change on the screen. The authors finally solved this problem by developing a single color pallet for all GOE years, and then incorporating it into the ToolBook. This was accomplished using a program called "Palette Optimizer" (palopt.exe) in the Asymetrix MTB4.0 software. This software samples all the colors in the ToolBook (all portraits and aircraft pictures) and builds a single master color pallet. A ToolBook developer may notice the new colors, but a user probably will not. So, this program restricts the number of colors used in the ToolBook, keeps colors consistent throughout the ToolBook, eliminates the "shifting" of colors, and speeds up the time to navigate through the ToolBook.

5. **Maximizing Performance:** When the GOE Team first scanned the portraits and aircraft into the computers, the ToolBook grew too large and became unsatisfactorily slow. The authors arrived at a solution using a variety of methods and tests.

First some raw data. A picture scanned in at 125 dpi with 16.7 million colors may take 5.1MB of memory to save. A page with this picture on it may take 70 seconds to transition into (if using a laptop)—much too long. By using Paintshop Pro (rather than OFOTO) and reducing the colors to 256, required memory space can be reduced to 1.7MB. This also reduces the transition time to 5 seconds. Then, by "re-sizing" the picture and reducing the number of pixels used to 250 x 344, the memory requirements are reduced 90 percent to 171kB—a reasonable amount of memory; and the transition time between pages is reduced to about 1 second. Re-sizing is not shrinking or contracting, which keep the memory constant and only make the visual picture smaller. Re-sizing is literally cutting off some of the picture (removing the dots or pixels) so memory size is reduced. However, "sharpening" the picture can double the required memory. These are the tests the authors conducted to determine the best looking ToolBook, not just the smallest files or fastest methods.

6. **Buttons:** Another trick to make things easier is to paste each portrait and craft on a button (instead of in a border or on top of a matting). This makes the entire picture "clickable" so that users don't have to hunt for a button.
7. **Help Line:** "When in doubt, call the company." We called the personnel at Asymetrix whenever we really got stumped. They would find an answer, for things like "pallet shift" problems, and call us back.
8. **Group Bitmaps:** Another way the GOE Team achieved faster performance was by combining all the pictures on the Master Gallery Page as one picture, on one button. This greatly reduced the amount of memory required, and therefore made the page turn much quicker. This idea of grouping area bitmaps works

anytime an author wishes to reduce memory and increase the speed of the ToolBook. On the Master Gallery Page alone, the GOE Team reduced the memory requirement by two-thirds, since three pictures were grouped as one.

9. **Kiss:** Keep ToolBook scripting simple. Keeping input lines as short and simple as possible will also keep problems to a minimum.
10. **Book Level Commands:** Input commands at the highest level possible, so the commands affect the greatest possible number of pages. There is no great need to input commands on every page, if it can be done at the "book level." For instance, "set field biography to zero" input can be made at the book level. Therefore, each page with a biography on it (that's half the pages in this ToolBook) will automatically scroll to the top, when the user leaves that page. That saves 50 page-level commands and makes changes easier if they are needed later.
11. **Scripting:** When writing the scripting, don't number the pages. Instead, name them for the subject of that page. They should be consistent (e.g., yeager94, yeager95, etc.). Then, when writing script for that page (as in the index), merely refer to that topic. This makes changes much easier. If pages are moved, the scripting doesn't have to change, for the script was written to follow the topic, not the page.
12. **Video Capture Analysis for the ToolBook:**

The Team's plan for video clip insertion consisted of a three-phases: video production using the best equipment available; video capture using Microsoft Windows VidCap version 1.00; and Video editing using Windows VidEdit version 1.00.

The Team started with the highest quality video format available, Beta, and used the Air University Television editing suites to incorporate the historic scenes and sound for the opening screen on the ToolBook. Music laydown was put in first, and then clips were inserted to match the music. Total run time was about 35 seconds. It is important to remember that, when transferring a video product to a computer digitized format, some quality will be lost. Therefore, start with the best possible images. One of the Team's first lessons learned involved scenes that were too dark to begin with. The authors had to go back into the editing suite to take those out and insert clearer and lighter ones.

The video compression setting we used was rated at "two" on a scale of zero to three. The higher the number, the higher the quality. Using one rated at "three" affected motion quality. Frames were keyed sequentially with a "one" setting to ensure frame rate consistency.

The team found that the resolution option was the most critical input in the digitization process. They chose a 160X120 setting (screen size matching) instead of 320X240, because there was a noticeable difference in motion quality. Because of the demand on pixel memory assignment, the picture itself was better, but with the result that motion became "chopped" with a strobe light effect.

The "picture effects" settings are also important. These are the "entering parameters" for digitization. The Team was not much off the scale from the factory default settings. Selected settings were 60 rating for contrast (high); 23 for tint (low); an 18 for saturation (low); and a 50 for brightness (high). Keeping the tint and saturation levels low helped with color pallet shift.

Frame rate manipulation, however extensive or extreme, proved to be a "non-player" as far as picture and motion quality. So the Team left it at the default setting (about 15.0).

During the computer editing process, The Team chose a one-to-one ratio (1X) for the screen size, because anything larger created a "grainy" picture and also slowed the natural motion of video images considerably. The team also updated the compression option to "Intel Indeo (TM) Video R3.2" but left the data rate at factory default, because it did not seem to make a large difference.

The audio settings were very straight forward. The GOE Team selected an 8-bit sample size; stereo channels instead of mono; and an 11 kHz frequency. All these provided clear sound that was well matched to the video images.

The fundamental lesson learned is that there is a tradeoff between picture quality and smooth motion. The higher the quality, the more memory there is to be processed and, therefore, the slower ("choppier") the picture will be.

13. **Beta Testing.** A BETA test was conducted to determine the quality, usability, and utility of this ToolBook. The individuals selected to survey this ToolBook had varying degrees of ToolBook experience—from no experience to those who use ToolBooks frequently. All testers used a 486-type computer, although of different manufacturers. While established survey parameters were not strictly followed, the results of the testing were favorable. Testers who ran the ToolBook over the LAN commented that the ToolBook ran somewhat slowly. Performance was improved when users were not connected to a LAN. All participants said the ToolBook was easy to load and access. First impressions were favorable regarding the graphics, page layout, interface, and artwork. Testers found the Instruction Page helpful and easy to follow. Some respondents stated that they were initially confused regarding the functions of the various screen buttons. All testers indicated that navigation was easy, and that the Index was useful and easy to use. Overall impressions were that the

ToolBook was a high-quality product, that it was easy to use, and that it responded quickly when not used over the LAN.

14. **Recommended Future Projects:** Adding the remaining GOE years not yet included is an obvious way to improve this ToolBook, assuming the speed does not bog down. Consider adding further data on the aircraft each Eagle flew.
15. **Danger:** Finally, a caution. Users should know this ToolBook was built for use on a Pentium-based machine. The ultimate format desired is for CD-ROM operation. The game plan is to cut a CD and have it run on a Pentium-based processor (8 MEG on the Motherboard) with a quad speed CD ROM drive.

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¹ This bibliography lists the information the GOE Team relied on to create the 1996 GOE booklet and the 1996 portions of the GOE ToolBook. Also cited in this bibliography are the GOE booklets from 1994 and 1995, which provided the basis for their respective portions of the GOE ToolBook. However, the information originally used to create the 1994 and 1995 booklets is no longer available and, therefore, cannot be cited.